

Colour Matching & Esthetics

Dr. Ahmad El-Kouedi
Lecturer of Crowns & Fixed
Prosthodontics

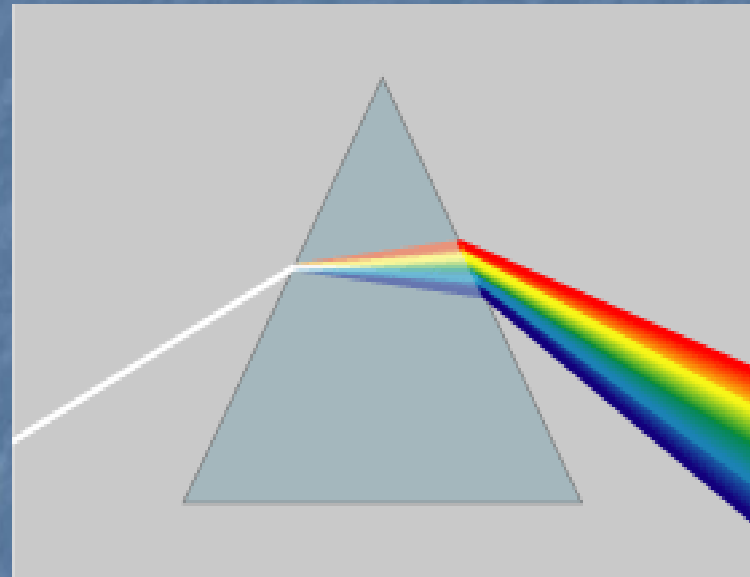
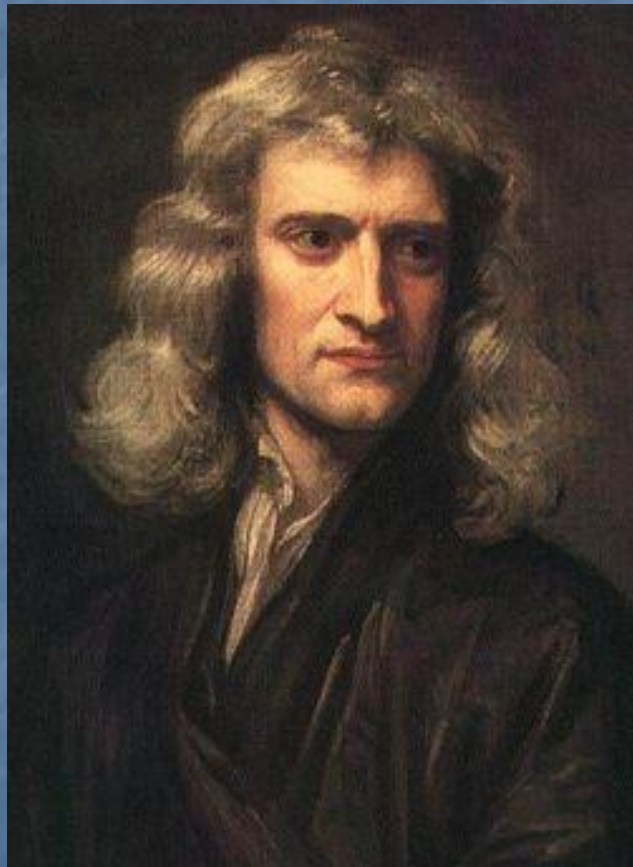
Esthetic Revolution

- 32% increase for plastic surgery
- 300% increase of cosmetic dental procedures

Light & Colour

- Light is an electromagnetic wave which is measured in nanometers (nm).
- Without light, colour would not exist and we would not be able to see.
- An object will absorb all the light and reflect those waves that we interpret as its colour.
- White light is composed of many colours, which can be separated using a glass prism that refracts (bends) the longer wavelengths less than the shorter ones, thus giving the different colours.

Sir Isaac Newton



Colour

- ***Colour*** can be divided into:
- Primary colours, which are red, blue and yellow.
- Secondary colours which are a mix of the primary colours
 - red + blue = violet
 - red + yellow = orange
 - blue + yellow = green
- The Munsell Colour System is the most widely popular system for describing colour.

- Hue

It is defined as the colour, shade or tint.

- Chroma

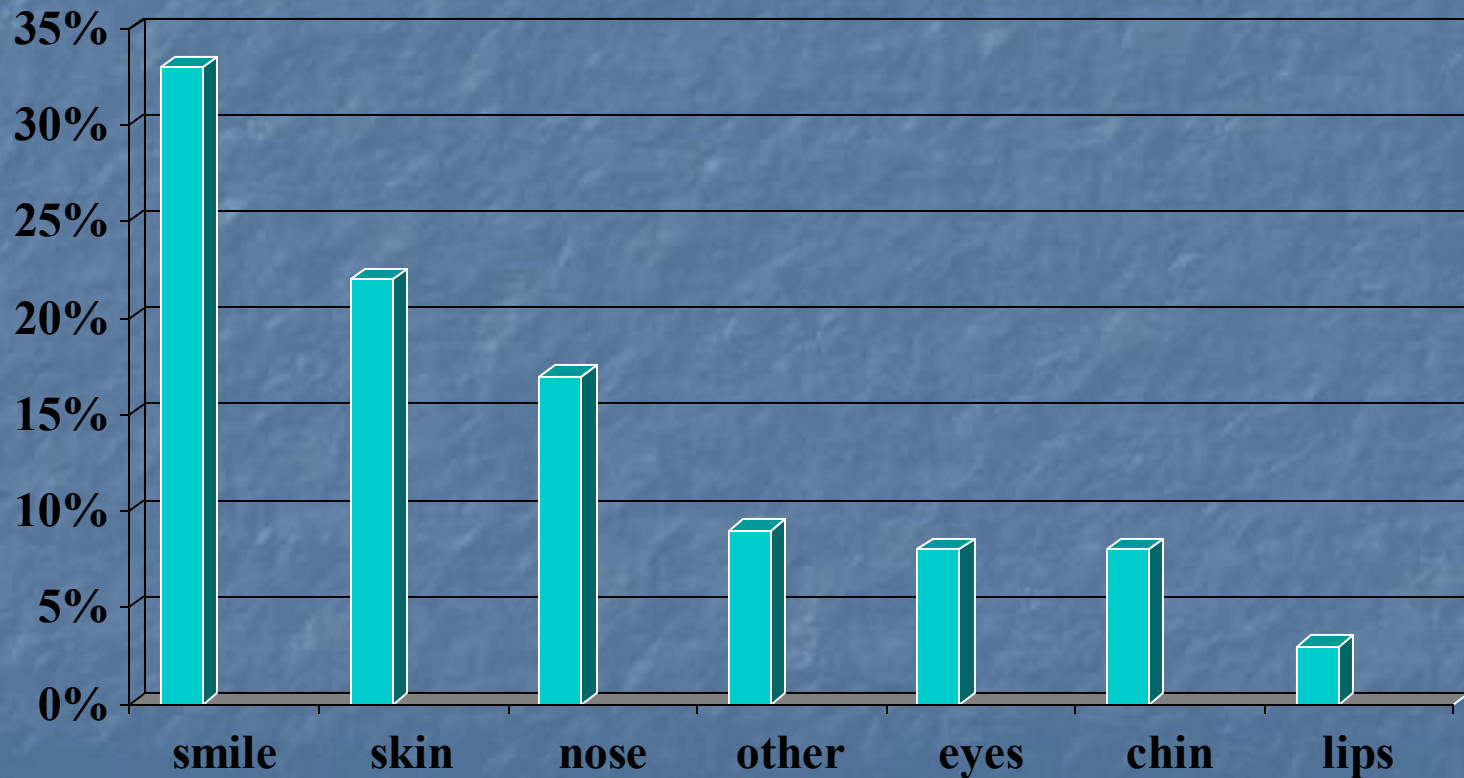
It is defined as the intensity of the Hue, ie. its saturation.

- Value

It is defined as the relative lightness or darkness of a colour, ie. its brightness.



The smile is the most desirable facial aspect that a patient would like to change



Esthetic Considerations

- A beautiful face has a beautiful smile. A successful prosthetic restoration will not disturb this beauty.
- The face can be divided horizontally into three equal parts, the forehead, mid section and the lower part of the face.
- Smiles differ from person to person, in sex and age. Most smiles show the maxillary anterior teeth, the premolars and a small part of the first molar.
- Little or none of the mandibular teeth show.

The smile improves

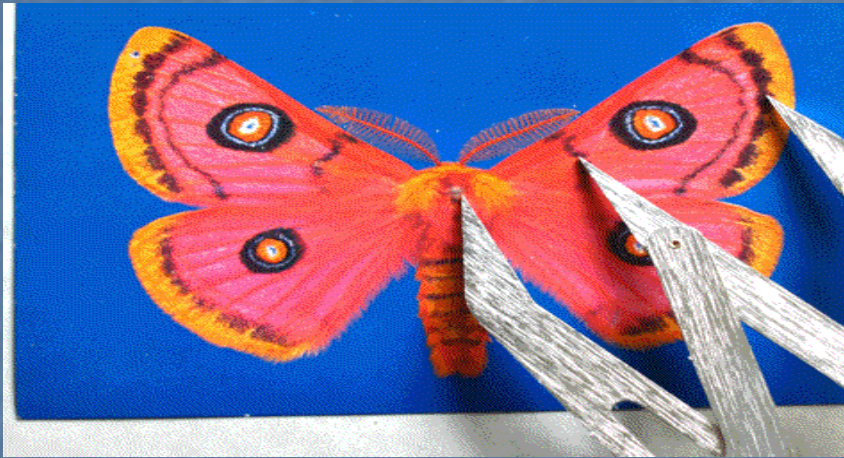
- Confidence and self-esteem.
- Professional and business life.
- Social life.



- This however changes with age. As time progresses gravity play its role, the muscles around the mouth sag. The maxillary teeth observed, diminishes and the mandibular teeth increase.
- Also women show nearly twice as much of their maxillary incisors than men.
- A “gummy smile” is when some of the attached gingival show. This is also known as a high lip line. This can be a problem when restoring missing upper anterior teeth when there is greater than average alveolar bone loss.

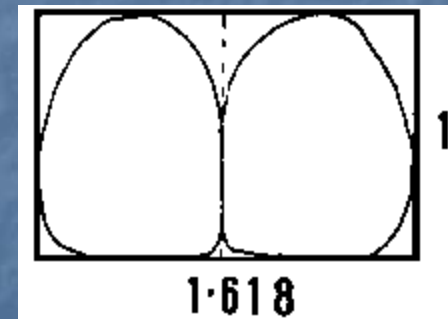
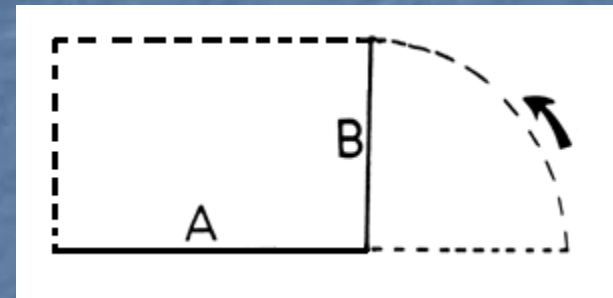
- Proportions play a big role in esthetics. When an object is in proportion it is considered beautiful. Concepts of proportions follow nature's rules.
- Leonardo Fibonacci, an Italian mathematician, devised a mathematical progression (the Fibonacci series) 1,1,2,3,5,8,13,21,34...etc.
- The ratio between the numbers is approximately 1.618: 1. This is known as the *Golden Proportion*.

Golden Ratio in Nature





Golden Ratio







Balance

- Balance or equilibrium can be defined as the stabilization resulting from exertion of opposing forces. The observer expects the right side of the face to be similar to the left side. Any unevenness in one side will be seen by the human eye as unbalance, hence unesthetic.

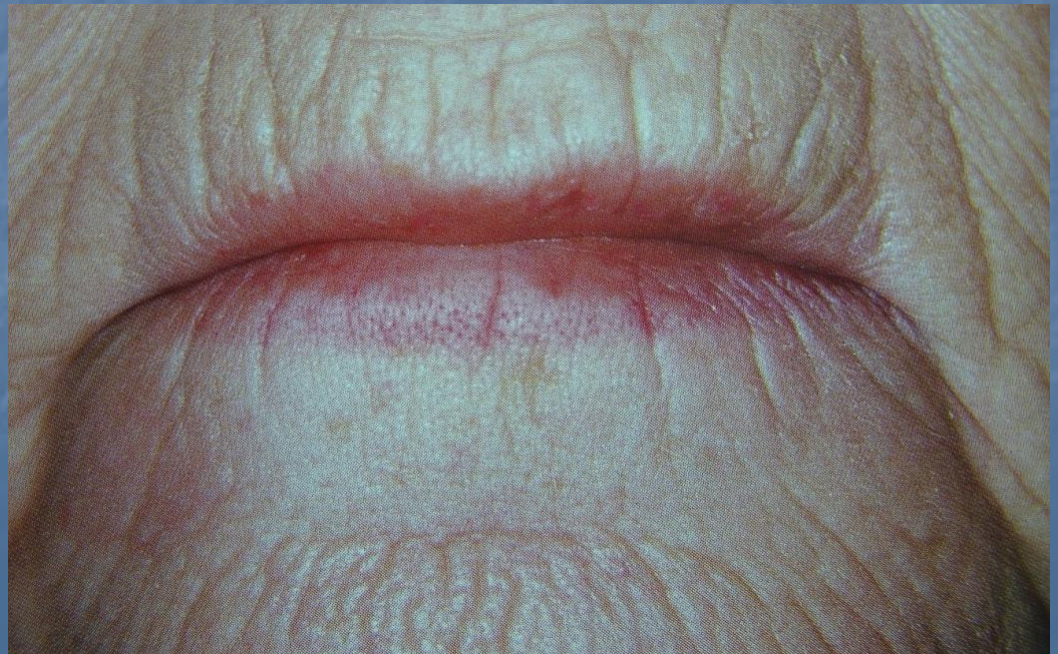
Lines

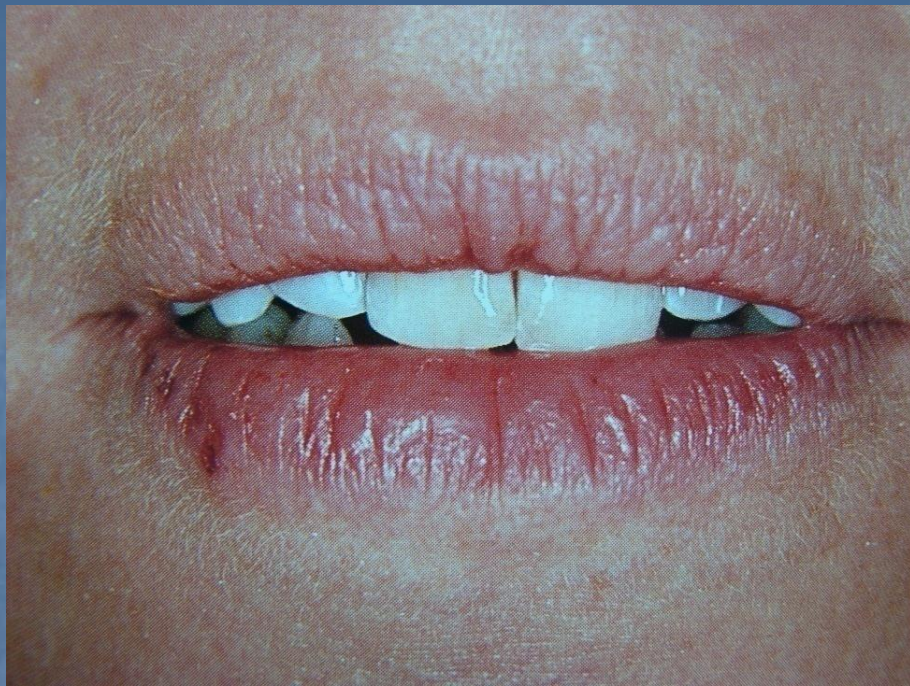
- Structural beauty depends on the visualization of lines. The face is cut in equal halves by the facial midline. The pupillary and commissural lines are parallel to each other. Parallel lines develop harmony. Therefore any restoration should follow these lines and not cause any conflict. This is especially true for the incisal plane, occlusal plane and midline.
- Teeth have different shapes and sizes, but the right side should be a mirror image of the left, resulting in radiating symmetry.

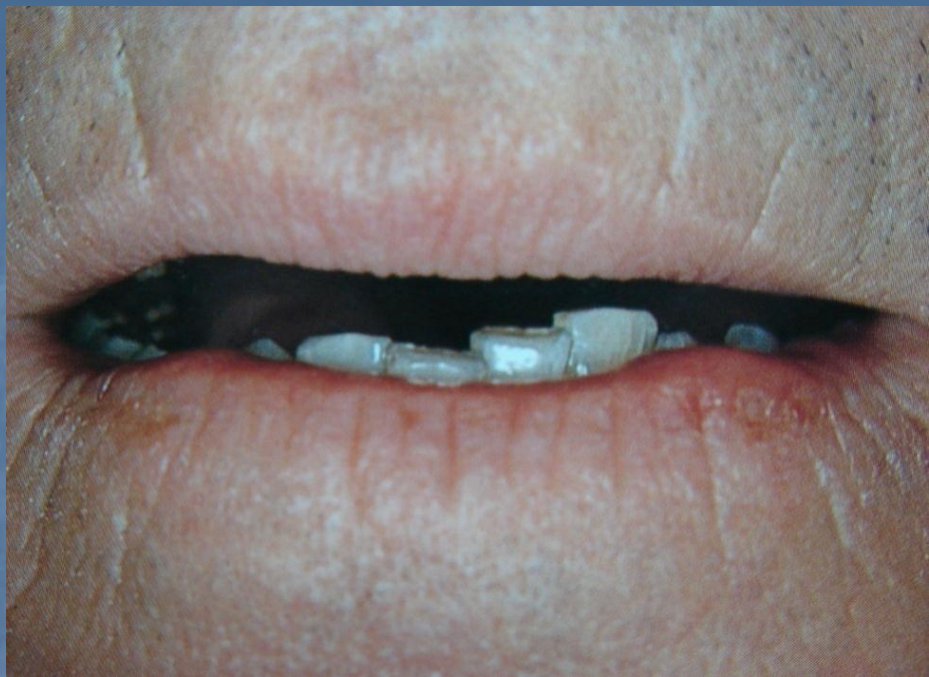
Age & Sex

- There is a difference between teeth in terms of their age. Young teeth when newly erupted are:
- Brighter (high value)
- Less Chroma
- Longer incisally
- Short clinical crowns
- Have significant incisal and gingival embrasures
- Have more texture and less characterized

- With age, use and exposure to the different oral conditions, teeth have the following appearance:
- Darker (lower value)
- More Chroma
- Shorter incisally (due to wear)
- Long clinical crowns (due to gingival recession)
- Reduced incisal embrasures (due to wear)
- Wider gingival embrasures (due to recession)
- Smoother and more characterized (stains, cracks, chip, etc)









- The form of teeth is affected by the sex.
Female teeth have:

More rounded line angles and incisal edges.

Pronounced incisal embrasures

More translucent incisal edge

- On the other hand male teeth have:

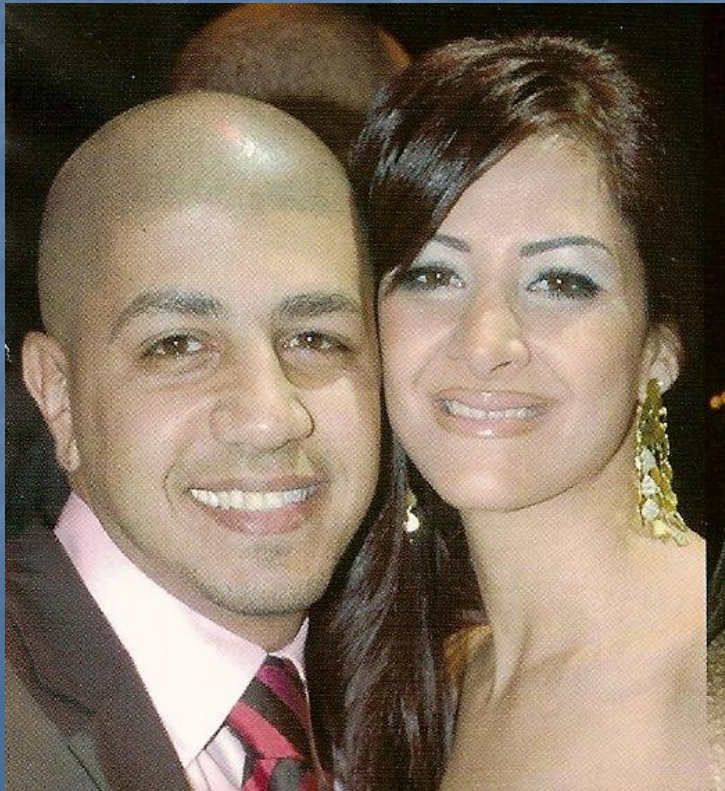
More angular teeth

Incisal embrasures are squarer

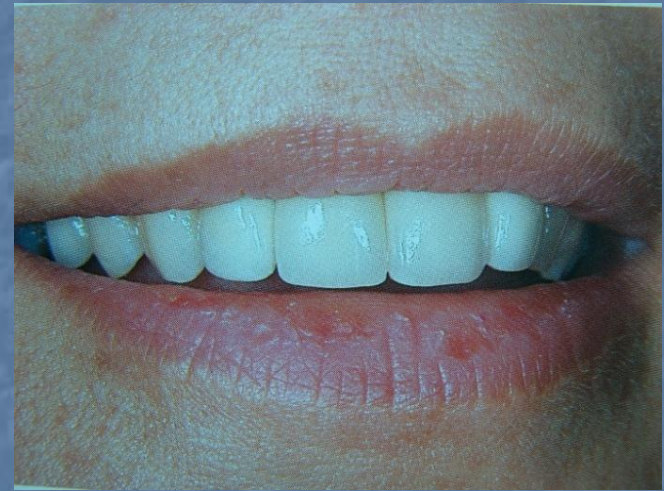
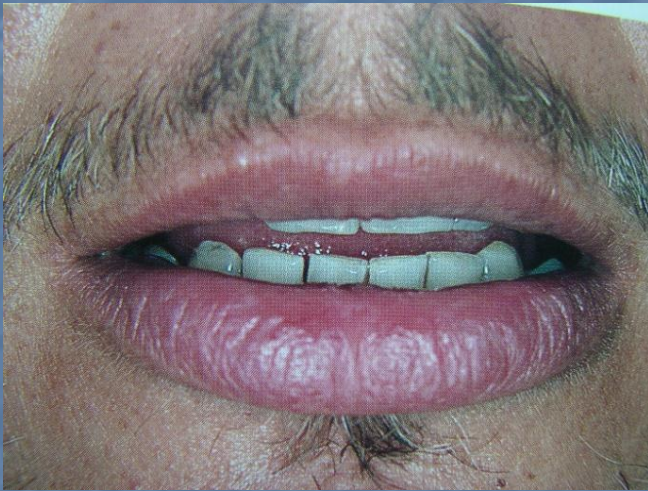
Characterization is more often seen







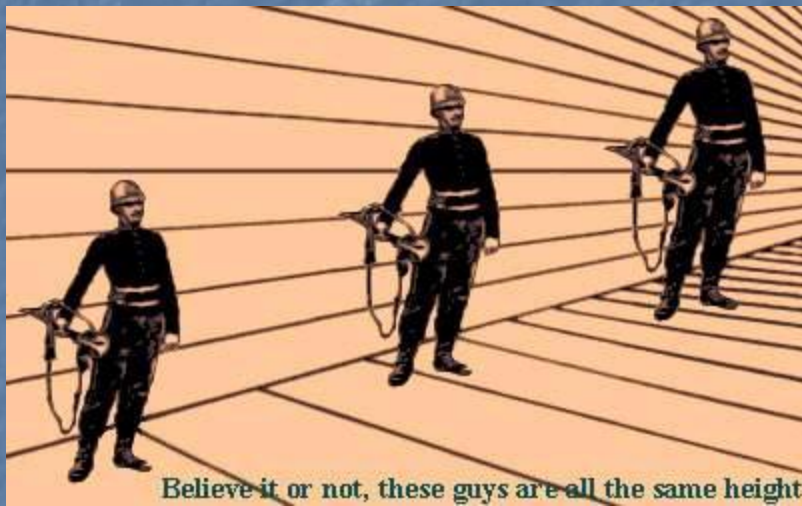
Relationship of the upper lip to the maxillary central incisor while smiling



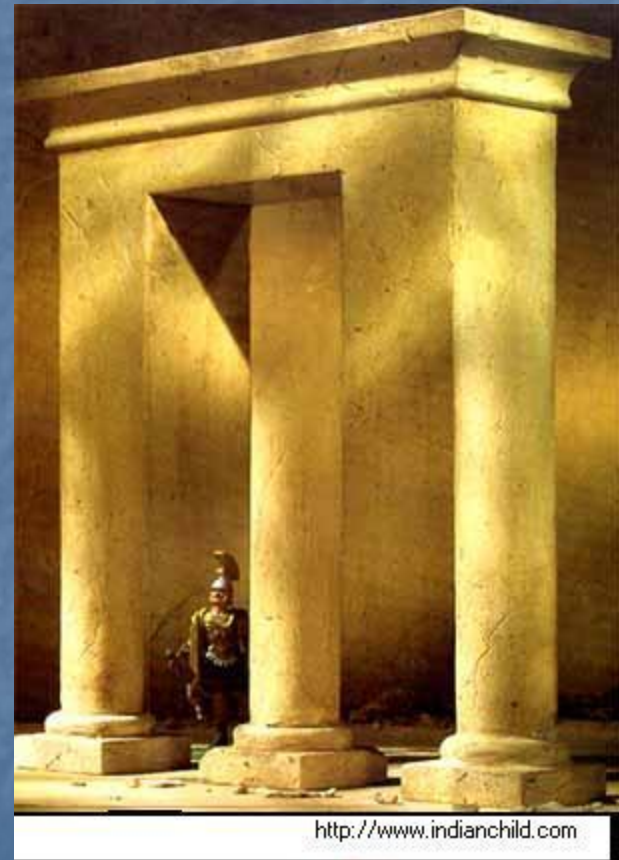


Illusion

- It is the art of changing perception, making an object appear different from its actual form. A prosthodontist can make a tooth appear longer, shorter, wider or narrower, older, younger than they actually are.
- We play with lines, shadows and light.



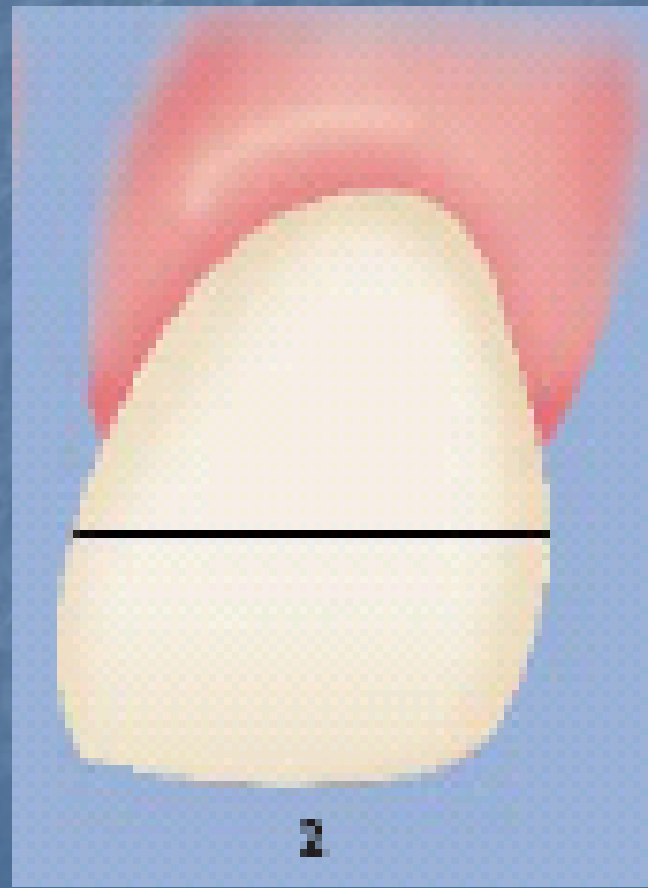
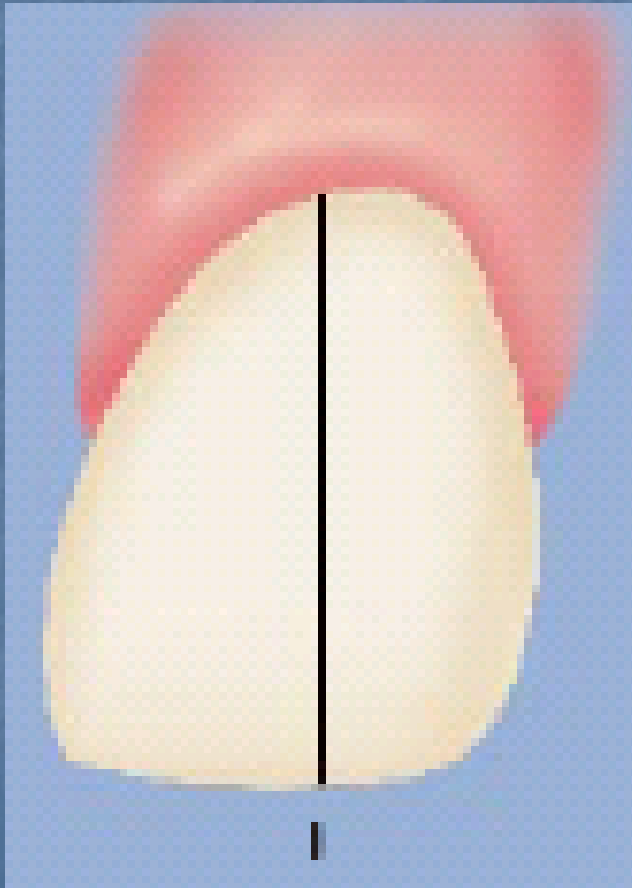
Believe it or not, these guys are all the same height



<http://www.indianchild.com>



Illusion of lines



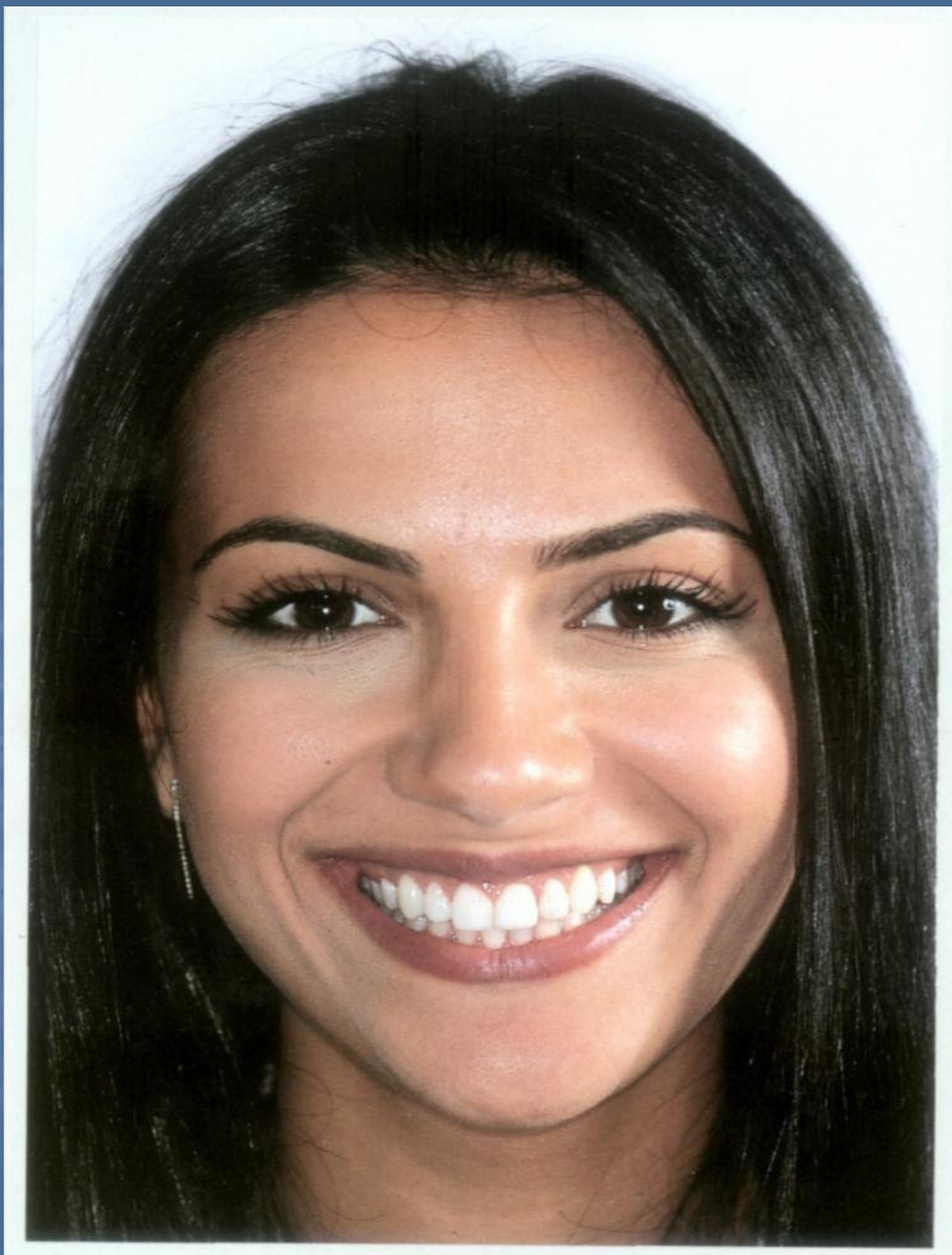
Gingival Condition

- A beautiful smile is not only about having nice teeth. A healthy gingiva complements a good smile. A healthy gingiva should be pink in colour, matt, firmly attached and stippled. Any swelling, redness and a shiny surface are indications of inflammation. Gingival treatment should be a priority in the overall treatment plan.









Esthetic Criteria

Face

Lips

Gingiva

Pink E.

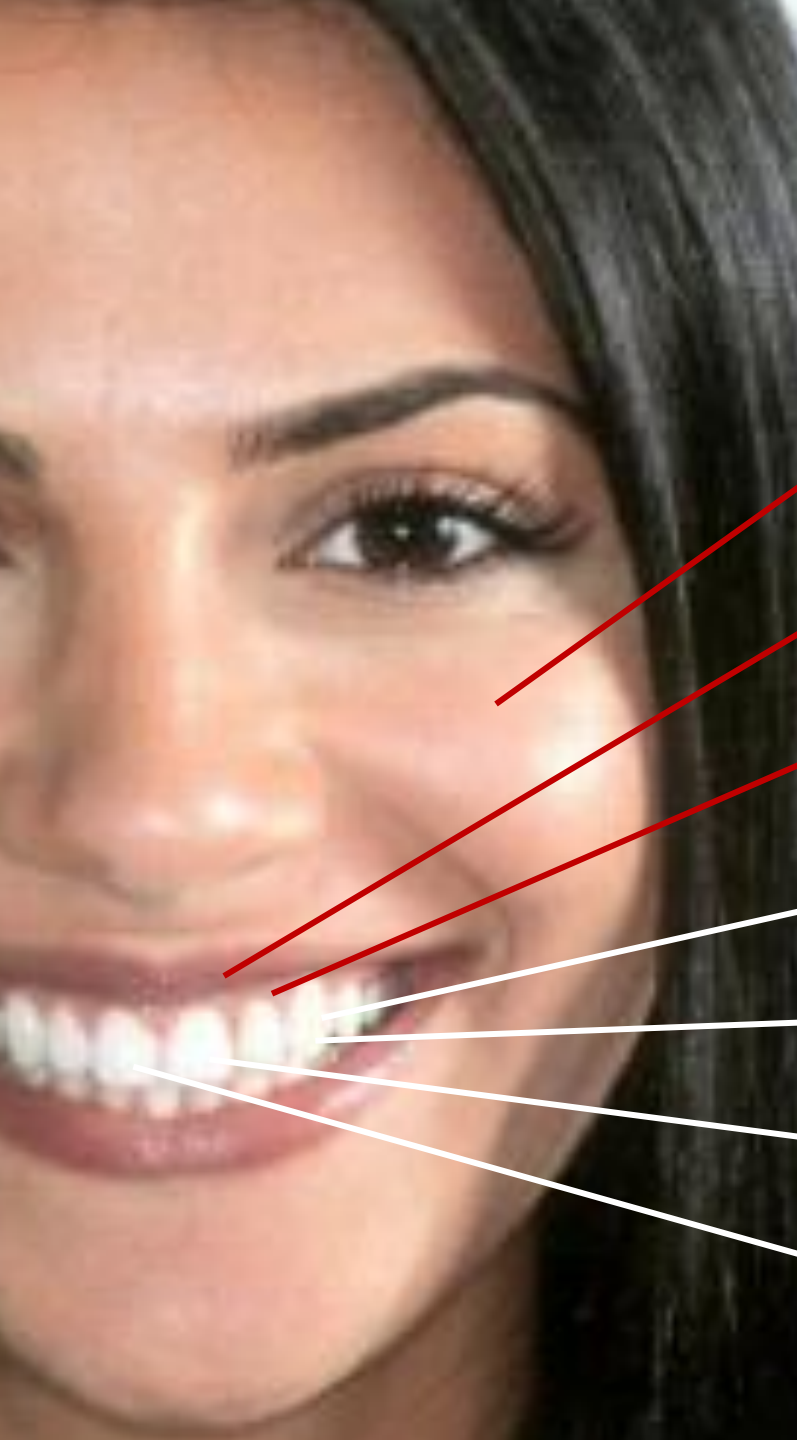
Alignment

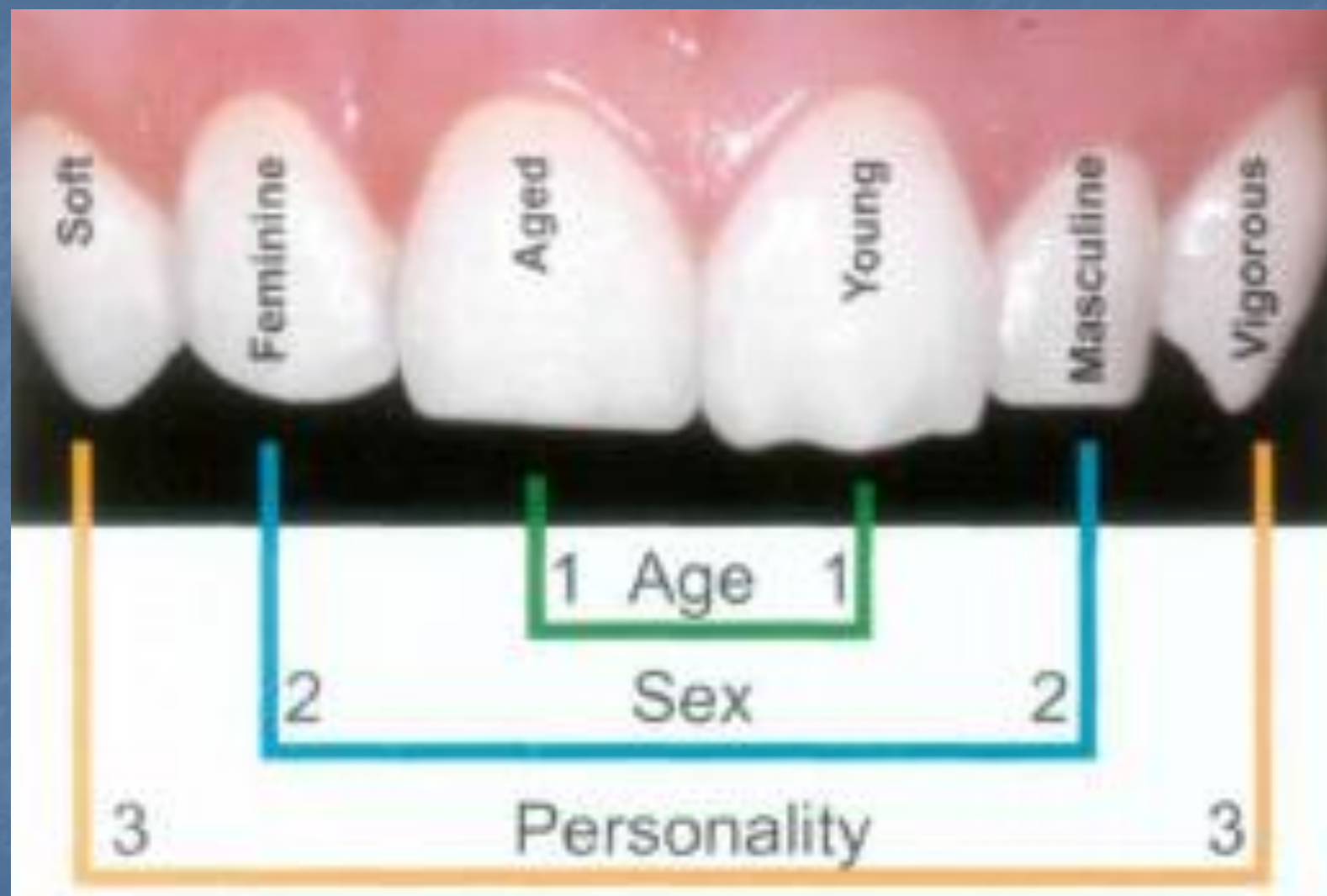
Proportions

Shape & Form

Color

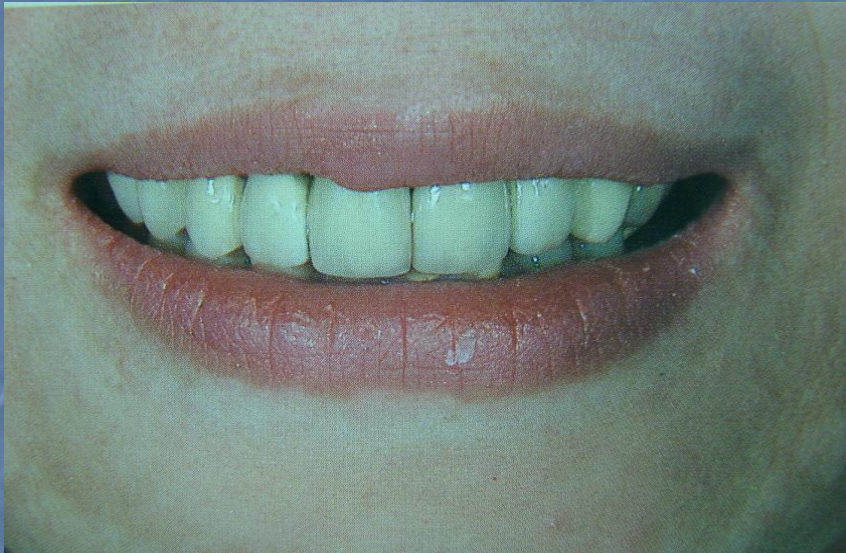
White E.



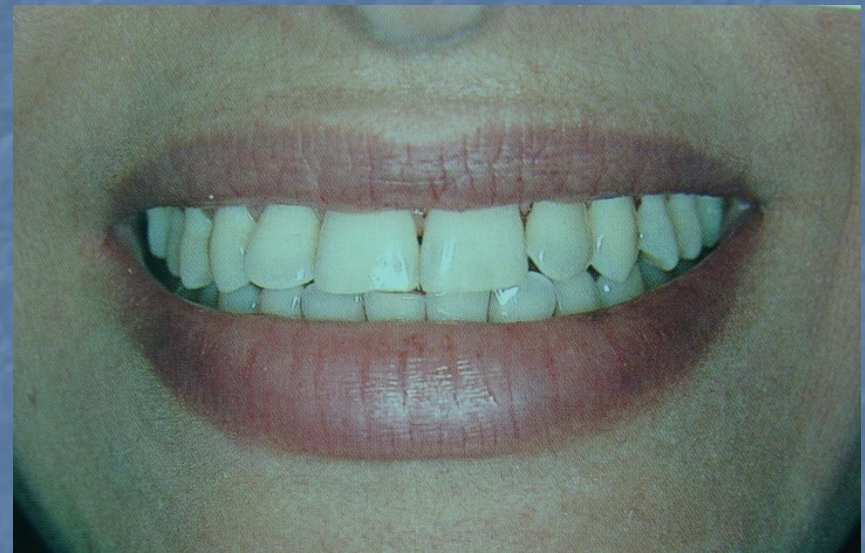


E-Negative Space.

The dark space that appears between the jaws during laughter and mouth opening. also the dark space appearing between the outer surface of the maxillary teeth and the corner of the mouth in smiling.



The presence of a lateral negative space is considered as a prerequisite of facial esthetics. It gives depth and mystery to the smile



The absence of a negative space indicates occlusal disturbances and poor smile

Shade Selection

- For the selection to be made properly the following guidelines should be followed:
- Selection to be done at the beginning of the session to avoid eye fatigue of the dentist.
- Ask the patient to remove any distractions from around the face, eg. lipstick, large shiny earrings, glasses etc.
- Use a shade guide similar to the ceramic type to be used by the dental technician.
- A quick polish of the teeth using a rubber cup and prophylaxis paste to remove any distractive stains.
- Seat the patient in an upright position. Observer should be placed between the patient and the light source.

- Observations should be done quickly (5 seconds or less). Any longer and eye fatigue can occur. The cones in the retina will become desensitized to distinguish between colours. Glancing at a blue object while resting the eyes helps neutralize this fatigue.
- Scanning the entire shade guide quickly, selecting which tabs are the closest the tooth colour. When there is indecision between two tabs, they should be held on either side of the tooth to help selection.
- Sometimes it is necessary to select the gingival, middle and incisal thirds separately to reach the correct match.
- Any special remarks as cracks, stains, hypocalification root exposure should be noted.
- The shade guide tabs should be wet similar to the wet tooth. Dry teeth have an increased value.

Shade Guides (Old system)



3D Master (new system)



Light Source

- For shade selection to be done correctly, it has to take place under the correct light source. A colour matched under one light can appear a different under another light source. This phenomena is known as Metamorism.
- There are many light sources in the dental office, such as the neon light (give a blue tint), incandescent light(light bulbs give a yellowish tint), corrective dental lamps, and natural day light (mid-day).

Variations Among Teeth

- Canines are the most intensively pigmented teeth.
- Lateral incisors show less pigmentation due to decreased thickness of dentine.
- Pigmentation is greatest at the cervical portion of the tooth.
- Translucency is best seen at the incisal edge, cusp tips and proximal surfaces where there just enamel with no pigmented dentine in the background.
- Translucency gives a more natural appearance to the restoration.